U.S. Army Research Institute for the Behavioral & Social Sciences

FACT SHEET

Virtual Environment Research for Infantry Training and Simulation

Developing Simulation Capabilities for Dismounted Soldiers

The Army's new missions and equipment mean increasing challenges for small unit Infantry leaders. ARI is working with other Army organizations to develop the virtual simulation capability to help them meet the challenge.

The Army's capability to use virtual simulation to train combat forces, evaluate new systems, and test operational concepts, is largely limited to mounted forces. Yet dismounted soldiers, particularly small unit Infantry leaders (platoon and below), face increasing responsibilities and challenges. These include new missions, changing doctrine, and sophisticated equipment. More sophisticated equipment will enable lower echelons to have more information about the tactical situation, command more firepower, and experience greater physical separation from other units. It will lead to increased independence of action and decision making responsibility at low echelons. These capabilities will require new tactics and new leader skills.

The Army needs improved capabilities for dismounted soldier simulation to support training, mission planning and rehearsal, and concept development and evaluation. The potential of emerging Virtual Environment (VE) technologies to meet these needs is currently unrealized due to hardware and software limitations and the lack of documented effective methods, strategies, and training support packages for their use.

The U.S. Army Research Institute for the Behavioral and Social Sciences Simulator Systems Research Unit (ARI-SSRU) initiated a program of experiments investigating the use of VE in training dismounted soldiers

in 1992. The program objective was to improve the Army's knowledge base regarding critical behavioral science issues supporting the design and use of virtual environment technology to provide effective, low-cost training and rehearsal. Following an analysis of the task requirements for dismounted soldier training and a review of the previous research in the use of VE for training, we conducted research investigating interface effects on the capabilities of participants to perform simple tasks in VE. Variables investigated included the type of control device, amount of practice on tasks, stereoscopic vs. monoscopic helmet-mounted displays, and display device types. We conducted experiments addressing the effectiveness of VE for teaching the configuration and

routes through large buildings, and the transfer of knowledge to the real world. We investigated factors affecting the accuracy of distance estimation in VE. Other research investigated the use of VE to represent exterior terrain, both for training land navigation skills and assessing situational threats, and the use of VE for training both distributed and local small teams.

This research program resulted in a set of recommendations for the use of VE for dismounted soldier training. These recommendations range from information about the types of tasks best and least-suited for training in VE to soldier-computer interface design and reduction of side effects. For example, we know that individuals can learn to find their way through real world spaces by rehearsing in virtual representations of those spaces, and that disorientation in VEs is a major impediment to training spatial skills efficiently in those environments.

ARI-SSRU is currently leading a joint Science and Technology Objective (STO) with the ARI Infantry Forces Research Unit, the US Army Simulation and Training Command (STRICOM) and the Army Research Laboratory (ARL) entitled "Virtual Environments for Dismounted Soldier Simulation, Training, and Mission Rehearsal." The product (FY 02) will be a High Level Architecture-compliant integrated prototype Infantry soldier simulation system to support training, mission rehearsal, concept development, and test and evaluation. It will include: a locomotion platform providing realistic movement and energy expenditure; a visual system including night vision sensors and equipment; computer-controlled forces representing enemy, friendly, and neutral forces; dynamic terrain and structures; and instructional features to enhance the training effectiveness and mission rehearsal. ARI-SSRU's STO contribution is: identifying high-payoff tasks; identifying training requirements; developing training vignettes and performance measures; developing training strategies and features; and evaluating training effectiveness.

For additional information, please contact Dr. Stephen L. Goldberg, ARI - Simulator Systems Research Unit, DSN 970-3980 or Commercial (407) 384-3980. Stephen_Goldberg@stricom.army.mil